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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/695,806

10/30/2003

Dale A. Trsar

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6880

7590

02/01/2005

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EXAMINER

ASSOUAD, PATRICK J

ART UNIT

PAPER NUMBER

2857

DATE MAILED: 02/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/695,806

Applicant(s)

TRSAR ET AL.

Examiner

Patrick J. Assouad

Art Unit

2857

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 May 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 3-6, 8-18 and 20-25 is/are rejected.
- 7) ☒ Claim(s) 2, 7, 19 and 26 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 March 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 5/13/04.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statement filed 5/13/04 includes a reference to US Patent 4,379,900. This patent is not relevant to the instant claimed invention and therefore was not considered. In addition, the owner of this Patent is not identified properly.

Drawings

2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the claimed "piezo cable," "displacement measurement device compris[ing] a cable...[that] has a resistance that is proportional to strain," "laser device," "machine vision device," "vibration sensing device," and "sound sensing device," must be shown or the feature(s) canceled from the claim(s). Note that the only "displacement measuring device" shown in the Drawings is potentiometer 135 in Figs. 1-2. No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate

changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

3. Claim 1 is objected to because of the following informalities: there is no clear nexus between the preamble ("evaluating engine cylinder contribution") and the body of the claim; there is no actual "evaluation of engine cylinder contribution" in the body; instead what we see recited is evaluation of "engine block movement." Appropriate correction is required.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Art Unit: 2857

5. Claims 1,3-6,8-18, and 20-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over DeBotton et al. (US 2004/0236494 A1) in view of Liang et al. (US 6,510,732 B1).

6. DeBotton et al. disclose :

A method and system are provided for diagnosing the health-condition of engines, in particular internal combustion reciprocating engines, in which the harmonic terms of the Fourier series representation of the engine vibration are correlated with the mechanical state of the engine. In particular, the characteristics of the harmonic components of the Fourier representation are monitored at one or more predetermined frequencies according to at least one first predetermined criterion, and the characteristics of these harmonic components are analysed according to at least one second predetermined criterion to determine the operational state of the engine correlated to the second criterion.

Fig. 4 of DeBotton et al. is reproduced below.

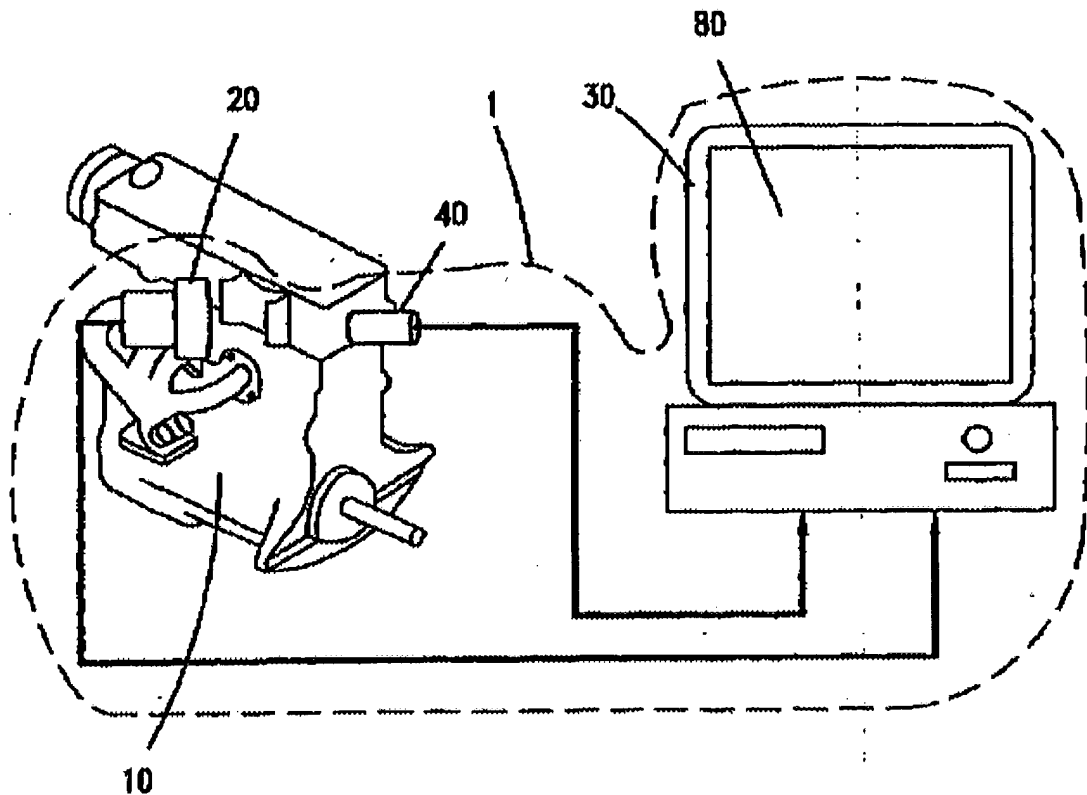


Fig. 4

7. The association between the instant claimed invention (independent claims 1,17, and 27) and DeBotton et al. is as follows: as per the claimed displacement measurement device or means for monitoring engine block movement, see the vibration sensor (20) mounted to the engine block (10) of Fig. 4 of DeBotton et al.; as per the claimed signal analyzer or means...for evaluating engine block movement, see the computer (30) of Fig. 4; as per the evaluation of engine cylinder contribution or evaluation of engine block movement, see at least the FFT vibration processing, vibration signature analysis, reference data base construction and comparison

Art Unit: 2857

regarding "strong/weak" or "disordered" cylinders of DeBotton et al.; and as per the claimed correlating the engine block movement to the firing order or means for correlating the engine block movement to cylinder firing order, see at least the "triggering transducer" of DeBotton et al. (para. 0144) which may be attached to the spark plug cables (or other points related to firing order) which is used to enable synchronization of the readings obtained from the vibration(displacement) sensor with the angle of the crankshaft.

8. Note that vibration is a known function of displacement/acceleration of engine block (10) and that the vibration sensor (20) of DeBotton et al. may be a "transducer such as an accelerometer, velocity transducer, optical or laser based vibration transducer...being held in place with any suitable, temporary fixing means such as magnets or straps..." (para. 0142)

9. The difference between the instant claimed invention and that of DeBotton et al. lies in the claimed detecting engine block movement "relative to a stationary structure" or "relative to a fixed position."

10. Liang et al. disclose :

A method and apparatus for determining the balanced condition of an engine having a balancer is provided. An engine balancer tester includes a sensor coupled to the engine. The engine generates first- and second-order vibrations that have vibration levels and the sensor generates a signal corresponding to the vibrations. A meter coupled to the sensor receives the signal and

Art Unit: 2857

calculates a ratio between the vibration level of the first-order vibrations and the vibration level of the second-order vibrations. A comparator compares the ratio to a predetermined value to assess the balanced condition of the engine.

Fig. 2 of Liang et al. is reproduced below.

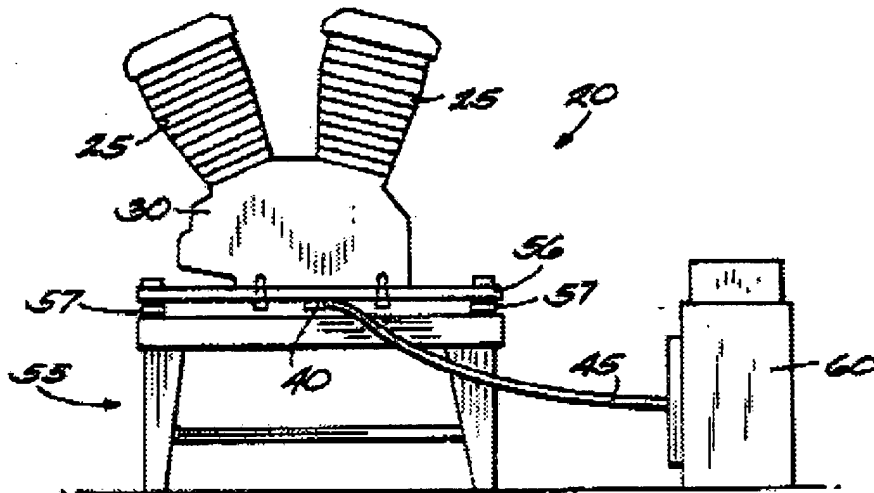


Fig. 2.

11. More specifically, in col. 2, lines 24-32, we see:

The engine 20 may also be tested when mounted on a test stand 55, as illustrated in FIG. 2, rather than when mounted on a motorcycle 10. The sensor 40 is permanently mounted underneath the test bed 56, which is supported by four rubber isolators 57 (see FIG. 2). Mounting the sensor 40 on the test bed 56 can save an operator time by not requiring a sensor 40 to be installed on the engine 20. The sensor 40 is electrically connected by a wire 45 to a production monitoring system 60.

12. From Fig. 2 (above) and its description, we clearly see vibration (acceleration/displacement) measurements “relative to a stationary structure” which is the test bed 56 and/or test stand 55 of Liang et al.

13. Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the “detection of engine block movement relative to a stationary structure” teaching of Liang et al. with the “universal diagnostic method and system for engines” of DeBotton et al. because such a combination provides accurate and reliable (vibration/acceleration/displacement) measurements for diagnostic purposes, and for fine-tuning an engine by accurately balancing all cylinder contributions relative to a fixed position or stationary structure.

14. As per dependent claims 6,8, see at least the laser based vibration transducer of DeBotton et al.

15. As per dependent claims 9-10, see at least the cable connecting sensor 20 to computer 30 and the required “ports” and a/d and other required signal processing hardware of DeBotton et al.

16. As per dependent claim 11 which refers to a “connection network configured to send and receive data”, a “communications interface”, a “processor” and a “memory”,

these are all required in any computer-controlled data acquisition system like that which is shown in Fig. 4 of DeBotton et al.

17. As per dependent claim 12, see at least the computer display of Fig. 4 of DeBotton et al.

18. As per dependent claim 13, see at least the computer processor of the computer 30 of Fig. 4 of DeBotton et al.

19. As per dependent claims 14-16, which refer to a cylinder clip or a distributor clip, see the aforementioned discussion of the "triggering transducer (40) of DeBotton et al. which may be attached to a number of components or engine systems such as spark plug cables, etc. Note that spark plug cables are always attached to both spark plugs and a distributor cap and that a distributor cap is always attached to an ignition coil and that any of these attachment points are taught in Debotton et al. to be used as "triggering" signals. See at least para. 0144.

20. As per dependent claims 18 and 20, see at least Fig. 4 of DeBotton et al.

21. As per dependent claim 21, see at least Fig. 4 of Debotton et al. or Fig. 2 of Liang et al.

Art Unit: 2857

22. As per dependent claim 22, see at least the computer display of Fig. 4 of DeBotton et al.

23. As per dependent claims 23-25 which refer to the trigger signal, see the above discussion of the "triggering transducer (40) of DeBotton et al.

24. As per dependent claim 28, see at least the processor or computer 30 of Fig. 4 of DeBotton et al.

Allowable Subject Matter

25. Claims 2, 7, 19, and 26 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

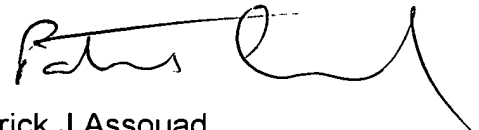
26. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. See the attached PTO-892. Most notable is Citron et al. ('870) which clearly indicates that the correlation between engine cylinder pressure variations and engine block vibration (displacement) was known in the late 1980s.

Art Unit: 2857

27. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Patrick J. Assouad whose telephone number is 571-272-2210. The examiner can normally be reached on Tuesday-Friday, 6:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marc Hoff can be reached on 571-272-2216. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Patrick J Assouad
Primary Examiner
Art Unit 2857

pja